

Annex 2. EJP SOIL call topics

Topic: Harmonizing soil information (DATA)

SE4/INDICATORS 2 European soil biodiversity forecast towards resilient agroecosystems in response to climate change

Rationale/Specific challenge: Soil biota are key in the functioning of soils and their contribution to ecosystem services. Yet, relatively little is known about the functional role of soil biodiversity and how belowground functional biodiversity can be stimulated to enhance soil functioning or provide resilience to climate change and adverse conditions such as drought or soil borne diseases. Little is also known as to what levels of biomass or activity of the soil biota would be desirable in the perspective of sustainable and climate-smart agriculture and the provision of multiple ecosystem services including climate change mitigation and soil borne disease controls.

The current status of soil biodiversity in Europe waits to be assessed (FAO-GSP-ITPS 2020¹). Therefore, both scientific research and policy instruments are needed. In particular in the light of EU Biodiversity Strategy, advances are expected concerning the development of functional indicators and target values for healthy soils and the expected soil functions and ecosystem services, in relation to soil types, land uses and climate zones to cover all relevant (soil) conditions.

Scope: The project is expected to use concepts, results and samples from previous projects and Long Term Experiments available through EJP SOIL partners. The project will be complementary to ongoing national and H2020 projects and in doing so will cover all regions and climate conditions across EU27. The objective is to provide at the European scale, regionalized maps of soil biodiversity and biodiversity decline, for various biological groups (bacteria, fungi, micro, meso and macro invertebrates) and selected associated functions (e.g. organic matter decomposition, nutrients provision, water retention, susceptibility to soil borne diseases) in agricultural soils. This will require the identification and selection of relevant indicators describing soil biodiversity from previous and ongoing projects. The focus will be especially on selected taxonomical and functional indicators and their evolution as a result from both climate conditions and from implementation of specific soil management actions to respond to climate change. Reference values for the selected functional indicators will be identified and time series established from archived soil samples to relate biodiversity to climate conditions and climate changes anticipated.

Time series of chrono sequences on soil biodiversity records in relation to climate sensitivity would be particularly helpful to indicate sensitivity to climate and agricultural soil use, e.g. from LUCAS or other archived soil samples and using PCR / DNA technology or other identification methods. The project will collect existing biodiversity data by EJP SOIL partners and EU countries. It will also use the existing knowledge and metadata related to soil type (national and commercial soil analyses; EJP SOIL Meta database), agricultural land use (cropland, grassland, agroforestry) and soil management in order to develop models for mapping soil biodiversity and related functions. Options will be identified to manage soil biodiversity and enhance soil quality and the challenges to adequately respond to climate change.

¹ FAO, ITPS., GSBI, SCBD and EC., 2020. State of knowledge of soil biodiversity - Status, challenges and potentialities. Report 2020, FAO, Rome.

Expected outcomes:

- Proposing functional indicators of soil biodiversity in relation to soil ecosystem services by connecting to existing and complementing the framework with the relevant parameters developed in e.g., SFS_21 projects and national programmes where appropriate;
- Sourcing data from previous projects and commercial soil analyses to produce maps of the current values and/or levels of these indicators at the EU scale to identify regional differences;
- Providing for climate responses and sensitivities of soil biodiversity indicators on the basis of archived soil analysis;
- Identifying thresholds and target values for biodiversity indicators and identification of policy instruments to address and enhance soil quality where appropriate with measures and actions.

Expected impacts:

- EJP SOIL EI1: Fostering understanding of soil management and its influence on climate mitigation and adaptation, sustainable agricultural production and environment.
- EJP SOIL EI4: Supporting harmonized European soil information, including for international reporting.

Project Type: Medium size research project (up to 2M€).